Boswellia serrata Roxb. ex Colebr.

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Taxonomy and Nomenclature

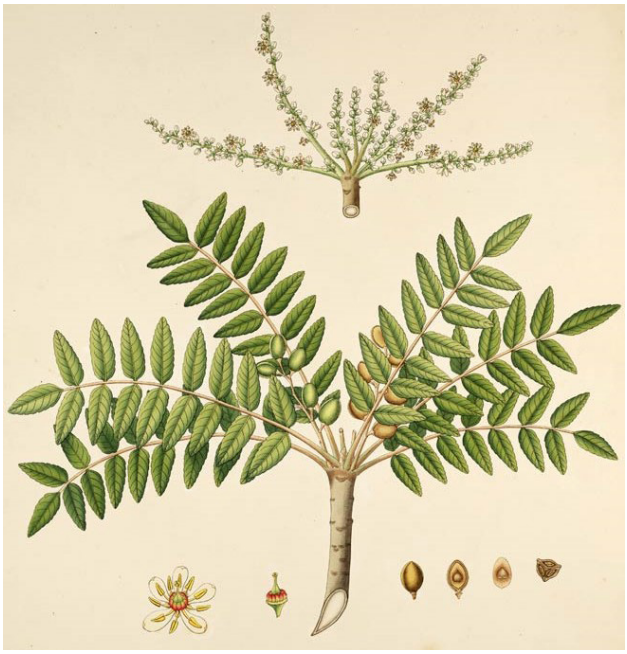
Species Name: *Boswellia serrata* Roxb. ex Colebr.
Synonym: *Boswellia glabra* Roxb. *Boswellia balsamifera* Spreng
Family: Burseraceae
Two varieties: *Serrata* with serrate and pubescent leaves, and var. *glabra* with entire, glabrous leaves
Vernacular (Common name): Salai (Hindi), Indian frankincense tree, Indian olibanum tree (English), gugulu (Tamil), kuurdur (Arabic)

Distribution and habitat

Boswellia serrata is distributed throughout the Indian subcontinent (with the exception of Bengal, Western Ghat and north-east India), primarily in Central India between 16° to 31° N latitude and 73° to 86° E longitude. The climate is with hot summer and mild winter with maximum shade temperature from 40°-48°C, and minimum 0°-10°C. The normal rainfall ranges from 500-2000 mm. The habitat is tropical dry deciduous forest. The tree grows gregariously in areas with the rainfall of 1500-1800 mm, but quick drainage is more significant than higher rainfall. Therefore, it grows well in hill slopes, ridges of hills, where it may occur at the elevation up to about 1150 m.a.s.l. The species is a strong light demander. It can grow on a wide variety of geological formation and soils, such as gneiss, mica-schist, limestone, shales and quartzite's of dry ridges and stony hills, and on flat terrain. It thrives both in fertile and shallow and poor soil. The species can withstand the adverse effect of forest fire and drought.

Botanical description

Boswellia serrata is a deciduous tree with a light, spreading crown and somewhat drooping branches attaining generally a height of 9-15 m with a short bole of 3.0 to 4.5m and a diameter of up to 70 cm. The bark is dark-greenish grey, thick, smooth, exfoliating in thin papery flakes, resinous inside. Leaves are exstipulate, alternate, 30-45 cm long, crowded at the end of branches; imparipinnate with 17-31 leaflets. Leaflets are opposite to sub-opposite, variable in shape and size, 2.5-6.3 cm long and 1.2-3.0 cm wide, sessile, ovate or ovate-lanceolate with dented margins and pubescent surface (var serrata) or with entire, glabrous leaves (var. *glabra*). Flowers are bisexual, small in short racemes, cream-colored, crowded at the end of branches, but not terminal. Calyx



is persistent, pubescent outside, 5-7 toothed; petals are 5-7 in number, ovate, free.

Use

The timber is moderately strong, but soft and non-durable when fresh; the seasoned timber is fairly durable. It is used in furniture, water pipes, matches, boat masts, plywood and veneers. It is used as raw material in paper pulp and newsprint. Charcoal made from it is used in iron smelting. The bark of the tree exudes a fragrant transparent yellowish-green oleo-gum-resin known as 'salai guggal' or Indian olibanum. A mature tree may yield about 2-2.5 kg of oleo-gum-resin a year. A volatile oil, resin and gum are produced from this exudation. The volatile oil is used as substitute for turpentine and used for paint, varnishes, soaps and perfumery industry. Gum is an excellent adhesive used in incense sticks, distempers, calico-printing, and in textile industry. The resin is a good substitute for Canada balsam in colour and consistency. It is used for manufacturing soaps, paints, varnishes and printing inks. The salai guggal gum has antipyretic, diaphoretic and astringent properties and used by local people for diarrhea, piles, ulcers, arthritis, skin and gastric problems. The flowers and seeds are edible. The species is suitable for reclamation of shallow ferruginous soil or dry sandstone hills with a mean annual rainfall of 500-1250mm.

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Fruit and seed description

Fruit: Fruits are simple, dry, dehiscent trigonous, 12-22 mm long capsules; fleshy, light green before maturation, but turn dry and brown after maturation, with three locules containing three seeds.

Seed: Seeds are solitary in each locule, compressed, hard, and winged along the margins. 13-25 seeds weigh one gram.1000 pure seed weight is 40-77g.

Phenology, flowering and fruiting habit

The white flowers appear in stout racemes at the ends of branches from the end of January to April. The leaves turn yellowish to light brown before they fall in December; the new leaves appear in May-June. The tree remains leafless during the entire period of flowering and fruiting. The drupes ripen in May-June. Flowers are self-incompatible. It is an obligate out-crossing species and the number of filled, viable seeds depends on the pollinators and density of the population. The giant Asian honeybee (*Apis dorsata*) and Indian honeybee (*A. cerana var. indica*) are effective pollinators.

Seed collection

Fresh fruits are collected from the trees. Seeds should be collected 2 months after anthesis in 1st week of May, when the fruits turn light brown. The collection method is to spread a tarpaulin under the tree and collect the fruits by lopping the branches or plucking before their splitting.

Processing and handling

Fruits split open, when dried under shade. Seeds are extracted from the dry ripe fruits manually and wings are removed by rubbing between hands and then cleaning can be done either by winnowing or by a seed blower. Seeds should be immersed in water before they are sown to separate out the empty seeds, which float on the surface.

Dormancy and pretreatment

Seeds have no dormancy and do not need pre-treatment.

Storage and viability

Seeds of *Boswellia serrata* are of orthodox type and can tolerate desiccation to 3-6% moisture content. Under ambient conditions (room temperature 15-37°C) the seeds can be stored for up to two years, if stored at 3-6% moisture content. Viability can be extended for more than three years, if stored at low temperature (-20°C to 15°C).

Sowing and germination

Germination is hypogeal. Germination percentage may vary from 20-90% dependent on the number of filled seeds in a seedlot. Seedlings can be raised in polythene bags filled with a mixture of loamy soil and decomposed farm yard manure. Two to three seeds are sown in each polythene tube (15 cm x 10 cm) in the month of July-August. Germination takes place within two weeks. The species is rarely raised in seedbeds as the root system is delicate and sensitive to mechanical handling. Seedlings of 10-12 weeks old (15-20 cm) are planted in the fields with a spacing of 5m x 5m. The seedling are prone to die-off during prolonged drought in the summer months. While some seedlings die out completely, most of them re-sprout in the rainy season.

Hence, irrigation at 15 days intervals during dry season (November to June) and mechanical weeding in the early years of formation of plantation are therefore necessary. Seedlings may grow to 2.75m in 3 years. 8-10 years are generally required to extract gum.

Phytosanitary problems

The tree is attacked by fungi and insects. The important fungi are *Ceratostomella* spp. and *Graphium* spp causing blue stain or sap-stain in the logs and planks when freshly cut. Some of the borer and beetle attacking logs are: *Atractocerus reversus, Carphoborus boswelliae, Coptops aedificator, Megachile disjuncta, Platypus solidus, Plocaederus ferrugineus, Sinoxylon anale* and *Xeleborus similis*. The deterioration can be lessened by cutting the logs into planks. *Rhesala imparata* is a defoliator of the species.

Selected readings

Sunnichan et al. (2005). Bot J Linn Soc. 147: 73-82.

Troup R. S. 1921. The silviculture of Indian trees. Government of India.

Luna, R.K. 1996. Plantation trees. International Book Distributors. Dehra Dun, India.

www.worldagroforestry.org/treedb/AFTPDFS/Boswellia_serrata.PDF

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